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Masó, in "The Rainfall in Philippines" (1907) and "Annual Amount and Distribution of Rainfall in the Philippines" (1914). In 1915, as a contribution to the Panama Pacific International Exposition, Rev. José Algué issued a pamphlet showing, on a map, three types of climate based on the monthly distribution of the rainfall and considered the characteristics of each type.

The present monograph is a new and original study, prepared for the Philippine Census of 1918. It is not only remarkably complete in all details, including many which are often omitted in climatic discussions, but it also lays special emphasis upon the weather conditions. Climate being average weather, a knowledge of the weather types which, taken together, go to make up any climate, seems to us absolutely essential. In climatological progress of the last decade, one of the most marked tendencies has been the increasing emphasis laid upon the weather element, with the result that recent studies have given far more complete, vivid, accurate, and withal interesting pictures of the climates with which they deal than was formerly the case.

This Report presents more data and deals with more stations than any previously published on the climate of the Philippines. Special emphasis is laid on rainfall, which is the most critical element of the climate in a region whose temperatures do not vary widely. The types of monthly distribution of rainfall are shown by means of a series of curves, and an interesting "climate map" indicates, by colors, the two main and the two intermediate types of rain distribution. On this map a novel and ingenious method of showing the annual amounts of rainfall is employed. These amounts are entered, for each station, in very legible figures, in color according to the amounts, the four colors used indicating rainfalls of under 1,500 mms., 1,500–2,000 mms., 2,000–3,000 mms., and over 3,000 mms. The resulting map presents the facts of annual rainfall and of rainfall types in a singularly clear and effective manner. On a somewhat similar scheme, the essential temperatures are shown. At each station there are three sets of figures, printed in a column. The first is the mean annual minimum; the second (in red) the annual normal; and the third the mean annual maximum. This map shows the temperatures very simply and clearly.

The typhoons which affected the islands during the period of 16 years are distributed by provinces and subprovinces, the tracks of remarkable typhoons being plotted. Accounts are given of all the principal floods and periods of drought experienced during the period. A page of curves of monthly mean temperatures for selected stations in Europe, the United States, and the Far East illustrates the steadiness and small ranges of the temperature in the islands. Several wind roses show the seasonal changes in wind direction, and bring out clearly the monsoon tendencies.

This new and interesting report will be welcomed as one of the important publications on climatography of the last dozen years. We commend it as a model of what a climatographic discussion should aim to be.

R. De C. Ward

An Ethnographic Handbook on the Philippines

A. L. Kroeber. **Peoples of the Philippines.** 224 pp.; maps, ills., bibliogr., index. (Amer. Museum of Nat. Hist. Handbook Ser. No. 8.) New York, 1919. 8 x 5½ inches.

This volume of the admirable Handbook Series of the American Museum is the fourth dealing with primitive races. The first three treated of restricted culture areas in North America, while the present volume deals with an area of entirely different character.

As the introduction points out, the Philippines present a field of exceptional interest to the student of the development of social culture inasmuch as they preserve a remarkable "stratification" of civilizations. The most recent "layer" includes the religious and cultural features of the Christian epoch dating from the Spanish conquest of the Islands in the later sixteenth century. Mohammedanism came two centuries earlier and still maintains its sway in the southernmost parts of the island group. More profound are the influences material and spiritual that, emanating from India, spread throughout the East Indies and probably reached the Philippines mainly by native channels of transmission. Contemporaneously there were relations with southern China, apparently on the material side alone. "There is not a single institution, piece of knowledge, or religious belief current in the Philippines that can be derived with any certainty from China." Below these is the stratum of primitive Malayan culture, and there are remnants of the still earlier culture known as Negrito.

Dr. Kroeber gives an illuminating exposition of the principal facts regarding the native civilizations and the racial and linguistic characteristics of the Philippine peoples, placing the whole in an adequate geographical setting. The paragraphs on population density and distribution (accompanied with map based on the census of 1903) are specially interesting.

Population even in pre-European times was comparatively dense. The lowest computation gives five per square mile, a figure greater than that for any parts of the aboriginal New World except parts of Mexico and Peru: Under Spanish rule population increased in the main because of removal of social causes militating against increase—piracy, human sacrifice, head hunting, etc. Comparatively little was done to render more land available for cultivation or to improve the yield from cultivated areas. The possibilities in these latter directions are enormous. The subprovince of Ifugao in the interior of northern Luzon, with an area of some 750 square miles of which less than 50 square miles are actually cultivated, is estimated to contain 132,000 inhabitants. This means that more than 2,000 people are supported by each square mile of cultivated land—a density rendered possible by the skilled works of terracing and irrigation that are astonishing achievements for so distinctly primitive a tribe as the Ifugao.

VEGETATIONAL STUDIES ON PHILIPPINE MOUNTAINS

WILLIAM H. BROWN. **Vegetation of Philippine Mountains: The Relation Between the Environment and Physical Types at Different Altitudes.** 434 pp.; map, diagrs., ills., index. *Manila Bur. of Science Publ. No. 13*, Manila, P. I., 1919. 9½ x 6 inches.

As the title implies, this is an attempt to relate the vegetation of different altitudes to the environment by measurement of the various climatic and soil factors. Most of the study is devoted to Mt. Maquiling, an isolated extinct volcano, 1,140 meters high, situated 64 kilometers southeast of Manila. A briefer study was also made on Mt. Banahao, 2,300 meters (pp. 391–405).

The vegetation of the slopes of Mt. Maquiling is divided into four types as follows: (1) *parang*, a Tagalog term for mixture of second-growth forests and grassland in early stages of recovery from former clearings, around the base of the mountain and extending up the slopes to an altitude of 200 meters; (2) dipterocarp forest, from the edge of the *parang* to an altitude of 600 meters; (3) mid-mountain forest, from 600 meters to 900 meters; and (4) mossy forest, on the top of the mountain and bathed in clouds for a large part of the time. A general description is given of each one of the vertical zones of vegetation.

Small plots, usually .25 hectare in area, are laid out, and a census of the vegetal population is taken. In this census, probably the most complete ever taken in a tropical forest, the well-known arrangement of the forest into stories is recognized, and the number of tree species of each story is recorded. For instance in the dipterocarp forests three stories are thus enumerated. The height of the tree, its diameter, and the length of the bole are measured; and from these data the volume of the wood is obtained. These figures show that, while the plot contains 92 species, only a few of them have the capacity to reach, when mature, the upper story, making it comparatively simple in composition. This is a confirmation of the investigation of the writer of this review made in tropical forests of both hemispheres and is of great importance from the standpoint of the lumberman, for trees of the upper story are usually the only ones of sufficient size to utilize on a large scale.

As one ascends any tropical mountain, it will be noticed that the height of the forest and the number of stories diminish. Brown's measurements show that in the dipterocarp forests (three stories) the tallest tree is about 40 meters and the average height of the top story is 27 meters; in the mid-mountain forest (two stories) the tallest tree of the first story is 22 meters and the average height is near 17 meters; while in the mossy forest (one story) the tallest tree is 13 meters and the average height is about 6 meters.

In order to explain, if possible, the interrelations of the different classes of vegetation at the same and at different altitudes extensive measurements of the environmental factors were made at five stations at different altitudes. In this way comprehensive data, more complete than ever before undertaken in any tropical country, were obtained of the temperature, light intensity, rainfall, soil moisture, humidity, evaporation, and wind velocity. In some instances instruments in the same station were set up at different heights from the ground, thus giving data concerning the local climate in different layers of the atmosphere. The readings extended over a period of some two years.